Update vaccines of normal infants:

Age	Type of vaccine
At birth	hepatitis B, opv
1 months	BCG
2 months	DPT, OPV, hepatitis B, HIb
4 months	DPT, OPV, hepatitis B, HIb
6 months	DPT, OPV, hepatitis B, HIb
9 months	OPV, vit A100000 IU
12 months	MMR, OPV
18 months	DPT, OPV, , hepatitis B, HIb MMR vit A 200000 IU
4-6 years	DPT, OPV, MMR

Vaccination of tuberculosis (BCG)

*** Definition:**

It's derived from mycobacterium bovis strain attenuated through tears of passage in culture media.

*** Age of vaccination:**

- **New born:** Through the first month
- **Children:** -ve tuberculin test, with contact with open TB.

*** Dose:** 0.1 mL injected ID in deltoid muscle insertion.

*** Value:** - Efficacy about 60%

- It prevents military TB

<u>* Complications of BCG:</u>

- Cold abscess→ Aspiration & injection of local streptomycin.
- Disseminated BCG infection → with ↓ immunity
- TB lymphadenitis → if given SC

<u>* Oral BCG vaccine: (غير متواجد في مصر)</u>

- Live attenuated bovine bacillus vaccine
- Given orally.
- During the first week.
- No complication

Vaccination of diphtheria, pertussis and tetanus (DPT)

<u>* Diphtheria toxoid:</u>

- Give protection for 10 years.
- Diluted toxoid (10-25%) is given > 7 years with less side effects.

<u>* Pertussis vaccine:</u>

- It's killed vaccines

- Side effects. (Common):

1- Pain, redness at site of injection.

2- Fever > 38°C

3- Drowsiness & anorexia & vomiting.

Rare:

1- High fever.

2- High pitched cry.

3- Convulsion.

4- Encephalopathy within 7 days.

*** Tetanus toxoid:**

- It's excellent vaccine against tetanns.

- Dose 0.5 mL injected IM.

(Pertussis vaccine) ملحوظة هامة عن

There is **a**cellular **p**etussis vaccine developed in Japan, and has little side effects caaled (**ap**)

So,

In Europe (DPT) is replaced ly (D**ap**t)

*** Indication of Dapt:**

1- Adolescents ≥ 12 years.

2- Pregnant females.

3- All persons in contact with children < 1 year.

4- Catch up vaccine:

- Persons from 7-10 years without Dapt vaccine

As follow: → 1st dose → Dapt vaccine

→ then if need additional dose → DT vaccine

Vaccinations of poliomyelitis

* **Types** → OPV → sabin vaccine (live atten.)

→ IPV → salk vaccine (killed)

* **Dose**:

(Sabin OPV)	(Salk IPV)
*** Oral: 2 drops** *** Primary:** → 2mo → 2drops Po **(بالفم)** → 4mo → 2 drops Po → 6mo → 2drops Po *** Booster:** → 18 mo → 2 drop Po → 4 years → 2 drop Po	*** Sub. Cutaneous S.C** *** Primary:** → 2 mo → 1mL sc → 4 mo → 1 mL sc → 6 mo → 1 mL sc *** Booster:** → 18 mo → 1 mL sc → 4 years → 1 mL sc
*** side effects:** - It's associated with remote risk of paralytic disease in about 1/9000,000 vaccine	*** Side effects:** - Pain, tenderness, Erythema - Fever - Expressive - Doesn't give immunity to **GIT**

Precautions:

→ **OPV:** not given > 18 years.

→ **OPV:** not given to immuno – deficient persons.

<u>* Causes of failure of OPV:</u>

- If given with breast feeding.

(لبن الام يحتوي علي اجسام مضادة ضد الفيروس)

- Vomiting within minutes.
- Bad refrigeration.
- GIT infection with other virus as coxsacki virus.

<u>* Indicatioins of salk vaccine:</u>

- Immunodeficient persons.
- Individuals ≥ 18 years.
- Adults travelling to endemic areas of polio.

<u>"Vaccination against hepatitis B"</u>

*** <u>Definition</u>:**

There are two types: → Plasma derived vaccine.

→ Yeast derived vaccine.

*** <u>Indications</u>:**

- Routine obligatory in Egypt from 1992.
- Children in families of HBV infection.
- Contacts of positive HBV surface antigen.
- Children with frequent blood transfusioin .
- All medical staff.

*** Notice:**

- It's **not** harmful to:

→ Patients of HBV infection.

→ Pregnant

→ Immuno compromised

*** Dose:**

1- Infants to mothers of unknown status:

Give hepatitis B vaccine at birth.

IF infant < 2 kg,j give hepatitis B immunoglobulin with the vaccine.

2- Infants to mothers of positive HBs-Ag :

IM 0.5 mL hepatitis B immunoglobulin + IM 0.5 mL HB vaccine. (in delivery room)

Then continue → (1& 6 months four the initial dose).

At 9 month test the baby (HBs Ab)

If +ve → this means immunization is effective.

If –ve → (do HBs Ag)

+ve → this means vaccine failure. -ve → give 4th dose .

3- All others:

0-10 years → 0.5 mL → 0,1,6 months

Adults → 1 mL → 0,1,6 months

Vaccination Against Measles

* **Type:** live attenuated vaccine.

*** Cause of failure of vaccination:**

-Inert vaccine (wrong storage)

-No immune response

-Primary failure 5%.

-Immunized before 12 months due to presence of maternal antibodies.

* **Dose:**

0.5 mL of measles vaccine given SC.

*** Age of vaccination:**

- It's should be given 12-15 months of age.
- If given before this age → failure due to presence of maternal antibodies.
- If exposed or contact with a case of measles give vaccine if ≥ 6 months
- Booster does → 4- 6 years.

Side effects	Contraindications
▪ Fever . ▪ Skin rash . ▪ Seizures . ▪ Allergic reactions .	▪ After (Ig)→ vaccine should be delayed (3-11 mont) ▪ Pregnancy ▪ ↓ immunity.

Vaccination Against Rubella

*** Introduction:**

- It's live attenuated vaccine, available alone or combined with measles of mumps.

*** Dose:** 0.5 mL S.C. alone or with MMR.

*** Age:**

- Infants: 12-15 months.
- Booster dose: 4-6 years.
- Children at any age who have not received the vaccine.
- Females in child – bearing age (if not pregnant) and they are advised not to be pregnant for 3 months.

*** Side effects:**

- Joint pain, arthritis.
- Skin rash, lymphadenopathy.
- ITP: (self limited without treatment.)

* **Contraindications:**

- Pregnancy
- ↓ immunity as measles.

Vaccination Against Mumps

* **Introduction:**

- It's live attenuated vaccine, available alone or combined with measles & Rubella.
- Efficacy: about 90%

* **Dose:** 0.5 mL S.C alone or combined with MMR.

* **Age:**

- Infants: 12-15 months
- Children haven't received vaccine

*** Side effects:**

- Allergic reactions.
- C.N.S features as seizures , nerve deafness and encephalitis.

* **Contraindications:**

- Pregnancy → theoretical fetal death.
- After (Ig) →it should delayed 3 months.

- ↓ Immunity → as measles.

"Vaccination Against HAV"

* **Type:** Formal inactivated vaccine.

* **Dose:** 0.5 mL IM in deltoid muscle.

* **Age:**

- First dose after 12 months.
- Second dose 6 months later.

*** Side effects:**

Local	Systemic
▪ Redness. ▪ Soreness. ▪ Swelling of site of injection. ▪ Induration .	▪ Headache . ▪ Malaise . ▪ Fever . ▪ Loss of appetite .

CI: (Febrile illness & hypersensitivity)

Varicella Zoster vaccine

* **Type:** Live attenuated vaccine.

* **Age:**

  - 12-15 months
  - Booster dose: 4-6 years.

* **Storage:** it must be kept frozen until reconstituted and must be given within 30 minutes.

* **Side effects:** Swelling, redness, pain and varicella like mash (5 - 26 dayes).

Influenza virus vaccine

* **Type:** (killed vaccine: → minimal age 6 months)

  (live attenuated: → minimal age 2 years)

* **Persons:**

  - Chronic pulmonary or cardiac disease.
  - Chronic metabolic disease as DM.
  - medical staff.
  - Immunodeficiency people.
  - Chronic hemolytic anemia

N.B→ Vaccine should be updated annually

Rota virus vaccine

*** Type:**

- Rhesus tetravalent vaccine.
- There are 4 types of vaccines containing genes for antigens of human strains.

*** Age:** Minimum age is 6 wks.

*** Administration:**

- RV-1 → 2 months & 4 months
- RV-5 → 2 months & 4 months & 6 months

*** Catch up vaccine:**

- The maximum age for the first dose is 14 wks, 6 days
- The vaccine should not be given for infants of 15 wks or order.

"Conjugated pneumococcal vaccine"

*** Use:** - It's effective against bacteremia, meningitis.

*** Age:**

- Minimum age is 6 weeks.
- Pneumococcal conjugated vaccine (PCV) is given 2,4,6 months and booster dose at 12-15 months

*** Catch up:**

- All children from 2-5 years who have not given complete vaccine → give one doe of (PCV_{13})

*** Persons of high risk&in need to vaccine :**

- Chronic heart disease .
- Chronic lung disease .
- On Cortisone therapy . .
- Sickle all anemia .
- Immuno - compromised children (HIV, chronic renal failure, nephritic syndrome and radiation therapy.)

"Meningococcal vaccine"

*** Type:** Quadrivalent vaccine that uses the outer capsule of the bacteria.

*** Minimum age:**

- 6 wks for → Hib Mency.
- 9 months for → menactra.
- 2 years for → menveo.

كان هذا هو الحد الأدني لعمر الطفل في التطعيمات

*** Routine vaccination:**

- MCV4 → 11-12 years - Booster dose → 16 years

<u>* Vaccination of persons of high risk conditions:</u>

1- Sickle cell disease:

- 2 months - 2 years → Hib Mency 2,4,6,12,15 months

2- Complement deficiency:

- 2 months – 1.5 years → كما سبق

- 1.5 years – 2 years → 2 primary dose of MCV 4-D 8wks a part.

3- More than 2 years (Sickle cell disease & Complement Deficiency)

- Give 2 primary dose of MCV 4- D

- or 2 primary doses of MCV 4-CRM

4- Travelers to endemic area or to hajj (الحج)

- Give one dose of MCV 4 for protection against sero, groups A and w-135.

5- During outbreaks:

- Give appropriate series of Hib – Mency or MCV 4

Hemophilus influenza type B

*** Type:**

- 1st generation: Hib capsular polysaccharide vaccine.

- 2nd generation: Saccharide – protein conjugate vaccine.

*** Age:**

- 0.5 mL IM at age of 2,4,6.

- it can be given at the same time with DPT, OPV and MMR.

*** Booster:** 12-15 months of age

*** With high risk condition:**

- It's not recommended > 5 years.

- One dose may be given to persons of leukemia & sickle cell disease, HIV.

"Human Papilloma virus"

*** Routine vaccination:**

→ Infants: 3 doses of HPV vaccine at 0,2,6 months.

→ Adolescents: (11-12 years)

- Male: HPV 4

- Female: HPV 4, HPV 2

<u>* Catch up vaccine:</u>

- Given the vaccine HPV4 to males and (HPV-4 or HPV-2) to females at 13-18 years if not previously vaccinated.
- Duration between the first & second dose is 2 months.
- Duration between the first & third dose is 6 months.

"Rabies Vaccine"

<u>A- Active immunzattion:</u> **(عن طريق الفيروس المخفف)**

* **Type:** Purified chick embryo vaccine.
* **Dose:** 1mL of inactivated vaccine is given IM to persons suffering from animal bite.

*** <u>Schedule</u>:**

- 0 day **<u>(يوم العضة)</u>**	- day 3
- day 7	- day 14
- day 28	- day 90

<u>B- Passive immunization:</u>

*** Type:** Rabies antibodies (human origin)

*** Dose:** single dose 20 IM/Kg

*** Schedule:**

- 0 day **(يوم العضة)** - day 3
- day 7 - day 14
- day 28 - day 90

Vaccinations against parasites

*** Malaria vaccine:**

- **Old vaccine:** against plasmodium falciparum and plasmodium vivax.
- **Recent vaccine:** give immunity against various cycle stages.
- **Multivalent vaccine:** contain Ag from 4 parts of the life cycle
- **Vaccine against sexual stages:**

*** Bilharzial vaccine:**

- No vaccine is available for human
- Under trial → Live attenuated vaccine
→ Killed vaccine

*** Toxoplasma vaccine:**

- No human vaccine
- Successful vaccine to mice and guinea pigs by live attenuated.

Types of Vaccines & Toxoids

1- Live attenuated viruses:

* Measles
* Rubella
* Mumps
* OPV

2- Live attenuated strains of bacteria:

* BCG
* Oral typhoid vaccine

3- Killed vaccine:

* Hepatitis A
* Rabies
* Inactivated polio virus

4- Killed bacteria:

* Pertussis
* Cholera
* Parenteral typhoid vaccine

5- Purified immunological components of bacteria & viruses:

* Pneumococcal vaccine
* Meningococcal vaccine
* Haemophilus influenza type B (HIb)

6- By Genetic engineering:

* Recombinant hepatitis B vaccine

7- Toxoid: (Tetanus & Diphtheria)

Vaccines affecting C.N.S

التطعيمات التي تؤثر علي الجهاز العصبي

- Varicella zoster vaccine	**الحزام الناري**
- Herpes simplex vaccine	**الجدري**
- Influenza virus vaccine	**الأنفلوانزا**
- Polio viurs vaccine	**شلل الأطفال**
- Toxoplasma vaccine	**مرض القطط**
- Hemophillus influenza type b	**الأنفلوانزا الموسمية**
- Perdussis vaccine	**السعال الديكي**
- Tuberculosis vaccine	**مرض السل**
- Pneumococcal vaccine	**الألتهاب الرئوي**
- Meunigococal vaccine	**الحمي الشوكية**

Passive immunization

*** Definition:**

- It's the process of improving the status of immunity of individuals by administration of antitoxins or antibodies to prevent occurrence of the infectious disease.

*** Types:**

A- Natural:

- Maternal antibodies pass to the fetus via placenta because they are of IgG type as antibodies against measles, mumps and polio.

- They disappear after 6 months

B- Acquired:

Antitoxins	Antibodies
* Diphtheria * Tetanus * Botulism	* HB Ig * Pertussis Ig * Rabies Ig * Rubella Ig * Tetanus Ig * Varicella zoster Ig * CMV Ig

1- Antitoxins:

*** Diphtheria:**

- 3000-5000 units of diphtheria antitoxins is given IM

في حالة طفل مخالط لمريض دفتريا او تمت إصابته بالفعل ولم يتم التأكد من ذلك.

*** Tetanus:**

- 3000-5000 units of tetanus antitoxin is given IM after having an injury in park or street.

*** Botulism:**

- Botutinium antitoxin is given to treat botulism.

N.B.:

→ Before antitoxin ask about allergy

→ If there is allergic reaction give avil, solucortif vial or adrenaline IM 1/1000

2- Antibodies (Ig):

*** Hepatitis B Ig:**

- 0.06 mL/kg is given IM as soon as possible after exposure

- Second dose after 1 months

- Third dose after 6 months

- Can be given to infants of mothers who are carrier or acute or chronic hepatitis B.

* **Pertussis Ig**:

- Pertussis immunoglobuline is given to unimmunized infants < 2 years who are in contact with a case of pertussis.

* **Rabeis Ig:**

- 20 Iu/kg is given on exposure to animal bite (1/2 dose given locally and the rest (الباقي) is given Im

يعني ٢/١ الجرعة تحقن في موضع العضة والباقي عضل

* **Rubella Ig:**

- It's of limited value in the 1st trimester and given only in:
- Exposure to rubella
- Therapeutic abortion is refused by parents
- Dose: 40 mL is injected IM, Distributed at different sites

* **Tetanus Ig**:

- 250 -500 Iu. IM is more safe than tetanus antitoxin but of short duration

* **Varicella zoster Ig:**

- 3.5 mL IM given within 5 days of exposure to infection will ↓ severity of the disease
- It's given to children with contact with a case of varicella zoster.

* **CMV Ig & Botulism Ig:**

مفيش كلام عنهم في الكتاب مفيييييش

Types of Immunoglobulin (IM, IV, SC, mono clonal)

*** IM (Ig):**

In the past, it was used in treatment of immunodeficiency. Now, it's mainly used as passive immunity against measles and HAV.

*** Hepatitis A IM Ig:**

- Sexual contacts with people of HAV.
- Travellers to areas where hepatitis A is present where sanitary conditions are bad.
- All medical staff.
- Food providers.
- Allergic to the vaccine.

*** Efficacy:**

- If given with 2 wks 85%

*** Side effects:**

- Soreness at site of injection.
- Low grade fever.
- Anaphylactic shock (rare)

<u>* Measles IM Ig:</u>

- It's mainly indicated for people who are unvaccinated against measles and in contact with a case of measles.

* **<u>Time</u>:** it should be given within 5 days of exposure to infections.

* **<u>Dose</u>:** → 0.2 mL/kg IM, maximum 2mL

→ For immune - conpromised 0.5 mL/kg.

<u>* IV (Ig):</u>

* They are prepared form adult plasma donors, usually (IgG)

Solid indications.	**Possible indications.**
*1ry immune deficiency. * Kwasaki disease . * HIV & ITP. * After bone marrow transplantation.	* Toxic shock syndrome. * Guillian, barre syndrome. * Aplastic anemia
Side effects: * Nausea * Fever * Headache * Vomiting * Acute renal failure * Anaphylaxis	

<u>* S.C (Ig):</u>

It's used only for replacement therapy against primary immune deficiency

*** Advantages:**

- No need of IV access.
- Few systemic side effects.
- Improve quality of life of patients.

*** Disadvantages:**

- inability to give large volume by S.C. route.

*** Monoclonal antibodies:**

"Palivizumab" is monoclonal antibody against Resp. syncytial virus

معلش الاسم رخم شويه بالیفیزوماب ؟

*** Indications:**

Infants less than 2 years with

- Chronic lung disease.
- Chronic heart disease.
- Neuromuscular disorders.

Recommended immunization for travelers to development countries"

(التطعيمات الواجب تعاطيها عند السفر الي البلاد النامية)

1- Complete the age suitable schedule .

2- Dtap, Poli, pneumococcal, hemophilus influenza type b is given before departure

3- Measles is given 2 additional dose .

4- Rota virus.

5- HPV.

6- Hepatitis B.

7- Yellow fever .

8- Hepatitis A .

9- Typhoid fever .

10- Meningococcal

11-Rabies

Vaccination of immuno compromised infants

تطعيم الأطفال التي تعاني من نقص في المناعة (يتكرر كثيرا)

*** Introduction:**

Vaccination of these children depend on;

- The degree of immunodeficiency .
- Risk for exposure to disease .
- The vaccine .

*** General rules of vaccination:**

- Killed vaccines have no danger .
- Specific conditions as asplenia is in high risk of infections and in need to (hemophilu influenza type B, pneumococcal, and meningo coccal vaccines)
- High dose and more frequent doses may be needed due to weak immune response .
- Some children may be at risk of side effects of live attenuated vaccines .

1- Primary immune deficiency

* B - lymphocytes:

- Severe ↓ Ab:

As agamma globulinemia, common variable immunodeficiency

<u>- CI vaccines:</u>

- OPV.
- Small Pox.
- LAIV.
- BCG .
- Live attenuated typoid vaccine .
- YF (yellow fever.)

<u>- Risk specific recomm. Vaccine:</u>

- Pneumococcal vaccine .
- Measles vaccine .
- Varicella .

- <u>Effectiveness</u>:

Uncertain if depend on humoral immunity only

<u>ملحوظة:</u>

عند تعاطي المريض (IVIg) فإن ذلك يقلل من استجابة الجهاز المناعي للتطعيم

*** <u>Less sever ↓ Ab</u>: (**As IgA deficiency, IgG deficiency)

<u>* CI vaccines</u>:

- OPV
- BC
- Yellow fever

<u>* Risk specific recomm. Vaccine</u>:

- Pneumococcal vaccine.

<u>* Effectiveness:</u>

- All vaccines are usually effective .

T- lymphocytes:

Complete defect (scid)	Partial defect (Digeorge)
*** CI** - all live vaccine. *** Risk specific recomm**. - Pneumococcal *** Efficacy:** Depends on the degree of immunodeficiency	*** CI** - all live vaccine *** Risk specific recomm.** - Pneumococcal - Meningococcal - Hib *** Efficacy:** Depends on the degree of immunodeficiency

*** Complement:**

- CI → None
- Risk → Pneumococcal, menigococal
- Efficacy → All are effective .

*** Phagocytic function:**

- CI → Live bacterial vaccine .
- Risk → Pneumococcal.
- Efficacy → All are effective .

2- Secondary immune deficiency

*** HIV/AIDS:**

*** CI:**

- OPV
- BCG
- Small pox
- LAIV

*** Risk specific recomm.**

- Pneumococcal
- HIb
- Meningococal

*** Effectiveness:**

- depend on the degree of immune suppression

*** Malignant neoplasm:**

- **CI:** All live atten. vaccine
- **Risk:** Pneumococcal
- **Effectiveness:** Depends on the degree of immune suppression

Vaccines with corticosteroids

- Children receiving corticosteroid ≥ 2mg/kg/day for more than 2 wk. >>>>>give vaccine after 1-3 months.
- Children on the same dose but for < 2 wk → give vaccines directly after stoppage of corticosteroids.
- Children with lower dose of corticosteroid → give vaccine at the same time with corticosteroids.

ملحوظة :

تعاطى الكورتيزون لا يمنع من التطعيم في الحالات الاتية :

١- **جرعة الكورتيزون يوم ويوم.**

٢- **الجرعة اقل من ٢ مجم/كجم/ اليوم .**

٣- **الجرعة تؤخذ موضعيا كالكريم او الحقن في المفاصل.**

Preterm infants

As generally, the preterm can be vaccinated at the same age of full term except:

- BCG: → given when > 2kg.

→ given > 40 days.

- DPT: → unitl he is neurologically stable.

- Hept. B: → given when > 2 kg.

→ or > 30 day.

ملحوظة

الطفل ناقص النمو الذي يولد لام عندها (positive HBs Ag) .

حتما ولازمن ولابد ياخد كلا من تطعيم الفيروس وكذلك الاجسام المضادة معا

Patients with chemotherapy

- Live vaccines can be given of 3 months in remission without chemotherapy.
- All patients vaccinated during chemotherapy are considered unvaccinated and repeat vaccination after therapy.
- Hepatitis B vaccine should be doubled in patients of leukemia & lymphoma.
- OPV should n't be given to contact of patients of chemotherapy.
- All live vaccine including BCG should n't be given during therapy.

Varicella vaccine in leukemia

- Contact between children of chemotherapy and varicella cases must be avoided
- He can be vaccinated but :

  → Remission for at least 1 year.

  → Lymphyte count ≥ 700, platelet 100,000.

  → Immune suppressive drug is stopped .

  → Stoppage of steroid 2 wks later .

Vaccination with organ transplantation

- Before transplantation, most routine vaccines should be completed .
- After transplantation, children usually receive immunosuppressive drugs and can be vaccinated only by non-live vaccines.

Immunization of asthmatic children

- Yearly influenza vaccine to mild or moderate bronchial asthma.
- Chicken pox must be delayed until the child finish its course of corticosteroids.

-

Vaccination of children with splenetomy

1- Pneumococcal vaccines:

- Given 2 wks before operation.
- Or immediately after operation.
- Patients with hypo spleen function should be immunized immediately after diagnosis.
- Before 2 years it's better to given prophylactic antibiotic and this is more effective than vaccines.

2- Hemophylus inf. Type B:

- At 18 years old, most individuals will have natural immunity due to exposure.
- It’s important to patients with impaired splenic functions
- High dose of vaccine is indicated .

4- **Influenza immunizatioin:** it's recommended yearly for patient with immune deficiency.

Immunization of diabetic patients

- Give influenza vaccine to all diabetic patient from 6 months, at the beginning of winter season.
- Given at least one dose of pneumococcal vaccine for adults with diabetes .

